UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,189	10/24/2001	Kiyoshi Uchida	10873.818US01	7234

7590 07/24/2003

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903

EXAMINER
BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
1773	

DATE MAILED: 07/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

mk-4

Office Action Summary	Application No.	Applicant(s)	
	10/038,189	UCHIDA ET AL.	
	Examiner	Art Unit	
	Kevin M Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-18 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-18 is/are rejected.

7)☒ Claim(s) 5 and 7 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Examiner's Comments

1. Claims 1 – 18 are directed to an "optical disk", yet require that that reproduction be done via "a DWDD system" and that the "magnetic coupling" in the recording layer be weakened or cut-off. Furthermore, applicant's specification specifically recites that the claimed "recording layer" "includes at least three magnetic layers so information can be reproduced by the DWDD system" (*page 8, lines 6 – 7*). Since the DWDD system is characteristic of only magneto-optical recording media, the Examiner suggests amending the claims to more accurately reflect the disclosed subject matter, i.e. a magneto-optical disk. For purposes of evaluating the prior art, the Examiner has interpreted the claims to be directed to magneto-optical disks only for the reasons cited above.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Magneto-optical disk and method for producing same by initialized with a laser having a predetermined wavelength".

Claim Objections

3. Claims 5 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1 – 4, 6 and 8 – 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. (U.S. Patent App. No. 2003/0081510 A1) in view of Hashimoto (U.S. Patent No. 6,177,175 B1) and Knight et al. (U.S. Patent No. 6,449,221 B1), and further evidenced by Tsutsui et al. (U.S. Patent App. No. 2001/0005535).

Regarding claim 1, Murakami et al. disclose a method for producing a magneto-optical disk (*Paragraph 0001*) including a substrate (*Figure 40, element 1*) and a recording layer disposed above the substrate (*Figure 40, elements 3 & 4*), using light incident from the substrate side (*Figure 41*), the method comprising the processes of: (i) forming a first dielectric layer (*Figure 40, element 2*) , the recording layer (*elements 3 & 4*), and a second dielectric layer on the substrate in this order (*element 21 and Paragraph 0419*).

Murakami et al. fail to teach reproducing an information signal by a domain wall displacement detection (DWDD) system and (ii) irradiating the recording layer with laser light for initialization from the second dielectric layer side, thereby weakening magnetic coupling of a part of the recording layer.

However, Hashimoto teaches that magneto-optical recording media using domain wall displacement, i.e. DWDD, (*col. 1, lines 6 – 8 and col. 2, lines 12 – 16*) type magneto-optical recording media results in higher recording density than traditional magneto-optic media (*col. 1, lines 30 – 49*).

Hashimoto further teaches that annealing a portion of the magnetic recording layer by laser irradiation allows for the magnetic tracks to be separated from one another (*col. 6, lines 42 – 45; col. 19, lines 52 – 54; and col. 21, lines 18 - 36*). While Hashimoto fails to explicitly state that the separation of the magnetic tracks from one another means "weakening magnetic coupling of a part of the recording layer", the Examiner notes that Tsutsui et al. provides evidence that when the magneto-optic disk is subjected to laser irradiation, the "magnetic connection between adjacent tracks is cut" (*Paragraph 0084*). Therefore, the Examiner deems that the teaching in Hashimoto regarding separating the magnetic tracks reads on applicants' claimed limitations since the separation of the magnetic tracks is the result of the magnetic connection being cut, i.e. "weakened" to be near zero.

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Murakami et al. to utilize a DWDD type magneto-optical disk, as well as preliminary annealing by laser light of the

recording layer, as taught by Hashimoto and Tsutsui et al. inorder to produce a magneto-optical disk with high recording density and well separated recording tracks.

None of the above teach annealing the layer from the second dielectric layer side.

However, the Examiner notes that laser irradiation of magneto-optical disks can be done from both sides of the disk, e.g. two-sided magneto-optical recording media (*Murakami et al., Paragraphs 0359 – 0363*) and first-surface versus substrate-incident recording methods (*Knight et al., Figures 28A and 28B*). Therefore, the Examiner deems that locating the annealing layer above or below the substrate are equivalent structural locations since it is known in the art that the lasers can be mounted on one or both sides and that the lasers can either shine through the substrate or not.

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, an annealing laser above the substrate and an annealing layer below the substrate are structural equivalents in the field of heating means for annealing a magneto-optical recording medium. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Regarding claim 2, Murakami et al. teach the importance of optimizing the thickness of the second dielectric layer to maximize the polar Kerr rotation as well as the refractive index behavior of the film (*Paragraphs 0186 and 0420 - 0426*). Murakami et al. further disclose that the various layer thickness values are, at least in part, related to the wavelength of light used, since that effects the polar Kerr rotation and the

crosstalk (*Paragraphs 0164, 0165, 0170, 0178 and 0261*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the second dielectric layer thickness through routine experimentation, especially given the teaching in Murakami et al. regarding the knowledge that the relative thickness values are functions of the wavelength of light used. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 3, Hashimoto teaches that the specifics of the annealing layer are not critical and "[n]o particular limitation is imposed on an apparatus for the annealing. A laser used for record reproduction may be used as it is" (*col. 21, liens 18 – 36*) and further teaches condensing laser light by an objective lens (*col. 24, lines 2 – 6*).

None of the above teach a numerical aperture of "at least 0.65". However, Murakami et al. teach that it is known in the art that laser light is known to be focused by an object lens (converging lens) (*Paragraphs 0101, 0108 and 0109*) inorder to form a reproducible Gaussian temperature distribution with as small a spot size as possible (*Paragraphs 0006, 0101 and 0112*). Murakami et la. further teach that the numerical aperture (N.A.) of objective lens can be varied to effect the size of the laser spot in a laser that is focused by an objective (converging) lens (*Paragraphs 0006 and 0318*). Therefore, the Examiner deems that it would have been obvious to one having ordinary skill in the art to condense the laser light by an objective lens meeting applicants' claimed N.A. value inorder to obtain an optimal spot size by optimizing the results

effective variable through routine experimentation, especially since Hashimoto teach that the spot size should be controlled to be "somewhat narrower than the land width" (*col. 24, lines 4 – 6*).

Regarding claim 4, Murakami et al. teach that it is known in the art to utilize a separate laser beam for servo tracking to guide the track during rotation (*Paragraphs 0307, 0308 and* 0317). Since Hashimoto teaches that the annealing is only to be done on the land portions of the magneto-optical disk (*col. 6, lines 42 – 45*), it would have been obvious to utilize a laser light for servo tracking to insure that the laser only anneals the lands and not the grooves.

Regarding claim 7, Murakami et al. disclose, on the second dielectric layer, a heat conduction adjusting layer (*Figure 40, element 22 and Paragraphs 0409 – 0416 and 0428 – 0434*). The limitation(s) "for adjusting sensitivity of the recording layer after the process (ii)" is (an) intended use limitation(s) and is not further limiting in so far as the structure of the product is concerned. Note that "in apparatus, article, and composition claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. ***In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art.***" [emphasis added] *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967); *In re Otto*, 312 F.2d 937, 938, 136 USPQ 458, 459 (CCPA 1963). See MPEP § 2111.02.

In the instant case, since the layer is in the same structural location and formed of heat conducting materials, the Examiner deems that there is sound basis for the belief that there is no manipulative difference between the claimed and prior art process.

Regarding claims 8 and 12, these limitations are disclosed as described above.

Regarding claims 9 and 10, Murakami et al. teach SiN as a preferred material for the second dielectric layer (*Paragraphs 0274, 0417 and 0419*), thickness values overlapping applicants' claimed ranges (*Paragraphs 0420 and 0423*), and laser wavelength's overlapping applicants' claimed ranges (*Paragraph 0319*).

Murakami et al. further teach the importance of correlating the thickness of dielectric layers with the wavelength of light used (*Paragraphs 0258 - 0261*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of the cause effective variables such as the dielectric layer thickness and laser wavelength through routine experimentation, especially given the teaching in Murakami et al. regarding the fact that the thickness of the dielectric layer should be optimized based on the laser wavelength used.

Regarding claim 11, Murakami et al. teach that the refractive index of the second dielectric layer is larger than a refractive index of the first dielectric layer (*Paragraph 0426*).

Regarding claim 13, Murakami et al. teach a protective coating layer formed on the second dielectric layer opposite to the substrate, the protective coating layer being thinner than the substrate (*Figure 40, element 6 and Paragraphs 0114 and 0120*).

Regarding claim 14, Murakami et al. disclose a difference in level formed on the surface of the substrate on the recording layer side, and recording tracks of the recording layer being separated magnetically by the difference in level (*Figure 20 and Paragraph 0114*).

Regarding claim 15, Murakami et al. disclose the claimed invention as described above, and further disclose: "sample servo pits for conducting tracking control by a sample servo system are formed on the substrate" (*Figure 18 and Paragraph 0312*), "grooves to be recording tracks are formed in a concentric shape or a spiral shape in a recording/reproducing region of the substrate" (*Figures 20 and 49; and Paragraphs 0114, 0307 and 0308*), and "a track pitch of the recording tracks in a range of 0.5 μm to 0.6 μm" (*Paragraphs 0310*).

Regarding claims 16 and 17, these limitations are disclosed as described above.

6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. in view of Hashimoto, Knight et al. and Tsutsui et al. as applied above, and further in view of Morita et al. (U.S. Patent No. 5,991,258).

Murakami et al. in view of Hashimoto, Knight et al. and Tsutsui et al. is relied upon as described above.

None of above disclose controlling the land and groove reflectivity values to be within applicants' claimed ranges.

However, Morita et al. teach that magneto-optical disk (*col. 5, line 31*) with a track pitch less than 0.6 μm for use by lasers having ~420 nm wavelengths (*col. 6, lines*

39 – 50) can obtain high recording density while preventing readout errors by forming the land and groove reflectivity to be approximately equal to each other (*col. 3, line 62 bridging col. 4, line 9*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Murakami et al. in view of Hashimoto, Knight et al. and Tsutsui et al. to possess a land and groove reflectivity to be approximately equal to each other as taught by Morita et al. since one can then obtain a high recording density while preventing readout errors in a magneto-optical disk.

Allowable Subject Matter

7. The following is a statement of reasons for the indication of allowable subject matter: claim 5 has been indicated as containing allowable subject matter because while the prior art teaches using lasers for servo tracking and annealing/initializing, the prior art is silent regarding controlling the wavelength of the two types of lasers relative to each other.

8. Claim 7 has been indicated as containing allowable subject matter because while the prior art teaches annealing/initializing a magneto-optical disk prior to reading/recording information on it, the prior art fails to teach two separate, and sequential, annealing steps. I.e. the prior art fails to teach pre-annealing the optical disk before annealing/initializing the disk.

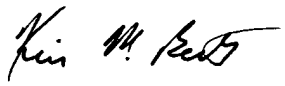
Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hozumi (JP 11-312342 A) teaches that track division can be eliminated by annealing and/or "division of magnetic connection between recording tracks" (*JPO Abstract*). Shiratori (JP 06-290496 A) teaches a DWDD method wherein the groove portions of the substrate are annealed (*description in Hashimoto '175, col. 1, lines 58 - 60*). Kubo (U.S. Patent No. 5,684,762) teaches the general state of the art, specifically that it is known in the art that the servo tracking signals and data signals are separate laser beams (*background section*). Morimoto (U.S. Patent No. 6,115,330) also teaches the general state of the art, specifically that using multiple laser beams having different phases/wavelengths is known in the art for reading/recording from the lands and grooves separately, but Morimoto fails to mention wavelengths for an annealing laser (*boxed and underlined sections of reference*). Hashimoto et al. (U.S. Patent No. 6,343,052 B1) teach a DWDD-type magneto-optical disk wherein the magnetic coupling between recording tracks is disconnected by etching instead of annealing (*boxed and underlined sections of reference*). Finally, Hattori et al. (U.S. Patent No. 6,445,669 B1) teach the general state of the art in terms of the difference between magneto-optical and "optical" phase-change or amorphous/crystalline materials (*boxed or underlined sections of reference*).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.



Kevin M. Bernatz
Patent Examiner

July 19, 2003